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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,133	08/16/2001	Hiroshi Hozoji	500.40506X00	1256

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EXAMINER

CHAMBLISS, ALONZO

ART UNIT PAPER NUMBER

2827

DATE MAILED: 12/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/930,133

Applicant(s)

HOZOJI ET AL.

Examiner

Alonzo Chambliss

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 and 23-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 1-21 and 23-29 in Paper No. 5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim 22 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected claim, there being no allowable generic or linking claim.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 8/16/01 in Paper No. 2 was filed before the mailing date of the non-final rejection on 11/24/02. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the

description: cavities 1022, fixed portion 10051, tool 1020', and resin layer 1009 all on page 85, stress compliant layers 1004a-1004d on page 87 line 25, and tool 1020" on page 88 line 20. Also, The drawings are objected to because they include the following reference sign(s) not mentioned in the description: 7, 1a-1d, 21-25, 31, 401, 66, 1007, 1090, and 1091. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claims 1, 2, 4, 15-17, and 26 are objected to because of the following informalities: : the phrase " to be ", since the phrase implies that the function can or does not have to occur. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. In Claim 1, the phrase " so as to be connected portion between said wiring and the outside electrically connected the wiring " is vague and indefinite since it is confusing to what applicant is making claim for.

9. Claim 2 recites the limitation " the external connection terminal " in line 10. There is insufficient antecedent basis for this limitation in the claim.

10. In claim 5, the phrase " almost enclosing " is vague and indefinite since it is not clear if the resin layer encloses the chip or it does not enclose the chip.

11. In claim 7, the phrase " inner circumferential side is gentler than that of an outer circumferential side of the insulating resin layer " is vague and indefinite since it is not clear how the inner side is gentler than the outer side of the insulating resin layer.

12. In claim 14, the phrase " almost equal " is vague and indefinite since it is not clear if the sum is equal to the distance from the mounted surface of the semiconductor device to the rear surface thereof or it does.

13. In claims 15-17, the phrase " between the wiring and the outside electrically connected to said wiring " is vague and indefinite since it is confusing to what applicant is making claim for.

14. Claim 23 recites the limitation " a semiconductor device " in line 4. There is insufficient antecedent basis for this limitation in the claim.

15. Claim 24 recites the limitation " said circuit board " in line 3. There is insufficient antecedent basis for this limitation in the claim.

16. In Claim 26, the phrase " and an outside " is vague and indefinite since it is not clear what is meant by outside.

Claim Rejections - 35 USC § 103

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16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

17. Claims 1, 2, 5-8, 10-14, 24, 26, and 27, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) in view of Yukawa (U.S. 6,436,733).

With respect to Claims 1, 2, 26, and 27, Launay discloses a wiring substrate 2 (i.e. support with connection terminals 9 and wiring 15) on which wiring 15 is formed. A semiconductor device 1 is electrically connected to the wiring 9, 15 by connection terminals 17 formed on the wiring substrate 2. An external connection terminal 8 is arranged on the semiconductor device mounted side of the wiring substrate 2 so that a connection is made between the external connection terminal 8 and the wiring 15 (see col. 1 lines 40-53 and col. 4 lines 31-59; Figs. 2-27). A thermoplastic material layer (i.e.

insulating strip layer 3) has a inclined portion at a given inclination to the mounting surface and a flat portion which is almost flat and which is thicker than the semiconductor device 1 between the wiring substrate 2 and the external connection terminal 8 (see col. 1 lines 61-67; Figs. 2-27). Part of the wiring 15 is formed on the inclined portion of the insulating strip layer 3. The insulating layer 3 is formed on a circumferential portion of the substrate 2 (see Figs. 4 and 5). Launay does not explicitly disclose a thermoplastic material including a resin. However, Yukawa discloses thermoplastic material 12a, 12b in the form of a resin (see col. 4 lines 14-18). Therefore, one skilled in the art would have readily recognized that an insulating resin is made of thermoplastic material, since a thermoplastic resin is used in high temperature electronic packaging applications and relieve stress between devices of different material as taught by Yukawa.

With respect to Claim 5, Launay discloses wherein the insulating resin layer 3 has a shape of almost enclosing said semiconductor device 1 (see Fig. 3).

With respect to Claim 6, Launay discloses wherein the insulating resin layer 3 is frame-shaped (see Figs. 4, 5, and 10-12).

With respect to Claim 7, Launay discloses wherein an inclination of an inner circumferential side has a gentler slope than that of an outer circumferential side of said insulating resin layer 3 (see Fig. 10).

With respect to Claim 8, Launay discloses the claimed invention except for a plurality of insulating resin layers are used instead of insulating resin layer. It would have been obvious to one having ordinary skill in the art at the time the invention was

made to have a plurality of insulating resin layers instead of one insulating layer, since it has been held that mere duplication of the essential working parts of a device involves routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Therefore, Launay discloses applicant's claimed invention of a plurality of insulating resin layers.

With respect to Claim 10, Yukawa discloses wherein the insulating resin layer 12a may be made of an insulating material having an elastic modulus of 3Gpa (see col. 4 lines 14-21).

With respect to Claim 11, Yukawa discloses wherein a film thickness of the insulating resin layer 12a is between 50 micrometers (see col. 12 lines 15-17).

With respect to Claim 12, Yukawa discloses wherein the semiconductor device is a ball grid array (BGA) (see Fig. 1), since the external connecting terminals can be placed on the external connection terminal (i.e. contact zones) of Launay to provide external connection to an external device, and an wafer-level CSP.

With respect to Claims 13 and 14, Launay discloses wherein a sum of a thickness of the insulating resin layer 3 and a height of said external connection terminal 8 is greater than and almost equal to the distance from the mounted surface of the semiconductor device 1 to a rear surface thereof (see Figs. 4 and 5).

With respect to Claim 24, Launay discloses a metal member 17 connecting said semiconductor device to the substrate 2 (see Figs. 13-16).

With respect to Claim 27, Launay discloses an intermediate plate 15 in the insulating material 3 between the semiconductor device 1 and the external connection terminal 8 (see Figs. 4 and 5).

18. Claims 3 and 4, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) and Yukawa (U.S. 6,436,733) as applied to claim 1 above, and further in view of Shoji (U.S. 6,054,171).

With respect to Claims 3 and 4, Launay-Yukawa both fail to disclose wherein the insulating resin layer is formed by mask printing. However, it is well known when applying a resin layer or film that mask printing is used as a technique to precisely control the thickness of the resin as evidence by Shoji (see col. 7 lines 59-63).

19. Claim 9, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) and Yukawa (U.S. 6,436,733) as applied to claim 1 above, and further in view of Hembree (U.S. 6,242,932).

With respect to Claim 9, Launay-Yukawa both fail to disclose the wiring substrate that is of glass. However, it is well known in the semiconductor industry that a substrate can be made of glass as evidence by Hembree (see col. 5 lines 65-67).

20. Claims 15-19, 21, and 25, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) and Yukawa (U.S. 6,436,733) as applied to claims 1 and 2 above, and further in view of Lee (U.S. 5,986,334).

With respect to Claims 15-17 and 25, Launay-Yukawa disclose the claimed invention except for a semiconductor device mounted on a wiring substrate without using an underfill. However, Lee discloses a semiconductor device 10 mounted on a wiring substrate 20 (i.e. a body 20 have leads 23A, 23B on the surface) without using an underfill. The semiconductor device is die attached the substrate 20 by wire bonding

(see Figs. 1A, 1C,2 and 3). Therefore, it would have been obvious to one skilled in the art to attach a semiconductor device without using an underfill, since wire bonding the semiconductor device to the wiring substrate would not require an underfill as taught by Lee.

With respect to Claim 18, Yukawa discloses wherein the insulating resin layer 12a may be made of an insulating material having an elastic modulus of 3Gpa (see col. 4 lines 14-21).

With respect to Claim 19, Yukawa discloses wherein a film thickness of the insulating resin layer 12a is between 50 micrometers (see col. 12 lines 15-17).

With respect to Claim 21, Launay discloses the claimed invention except for a second insulating resin layer are used instead of insulating resin layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a second insulating resin layer instead of one insulating layer, since it has been held that mere duplication of the essential working parts of a device involves routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Therefore, Launay discloses applicant's claimed invention of a second insulating resin layer.

21. Claim 20, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753)-Yukawa (U.S. 6,436,733) and Lee (U.S. 5,986,334) as applied to claims 1 and 16 above, and further in view of Shoji (U.S. 6,054,171).

With respect to Claim 20, Launay-Yukawa-Lee all fail to disclose wherein the insulating resin layer is formed by mask printing. However, it is well known when

applying a resin layer or film that mask printing is used as a technique to precisely control the thickness of the resin as evidence by Shoji (see col. 7 lines 59-63).

21. Claims 28 and 29, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) and Yukawa (U.S. 6,436,733) as applied to claims 1 and 16 above, and further in view of Lee (U.S. 5,986,334) and Shoji (U.S. 6,054,171).

With respect to Claim 28, Launay discloses the claimed invention except for wherein the first insulating layer relaxes a stress generated between the semiconductor module and another substrate on which the semiconductor module is mounted and is formed by using a mold. However, Lee discloses a semiconductor module mounted on another substrate. Therefore, it would have been obvious to attach another substrate to the semiconductor module of Launay, since the additional substrate allow the semiconductor module to be electrically connected other semiconductor devices on the additional substrate as taught by Lee. Furthermore, it is well known when applying a resin layer or film that molding (i.e. potting) would be used as a technique to precisely control the thickness of the resin as evidence by Shoji (see col. 7 lines 59-63).

With respect to Claim 29, Launay discloses the first insulating layer 2 formed in a circumferential portion of the substrate 2 (see Figs. 4 and 5).


The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

Conclusion

22. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956.

AC/December 14, 2002


Alonzo Chambliss
Examiner
Art Unit 2827